

Simulation of Historical and Future AMSAT Missions using NASA's Open Source “General Mission Analysis Tool”

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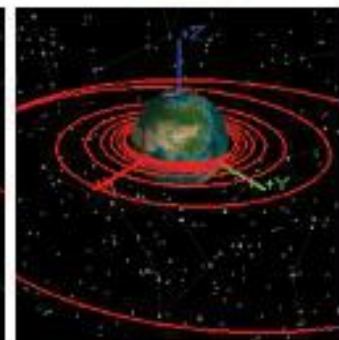
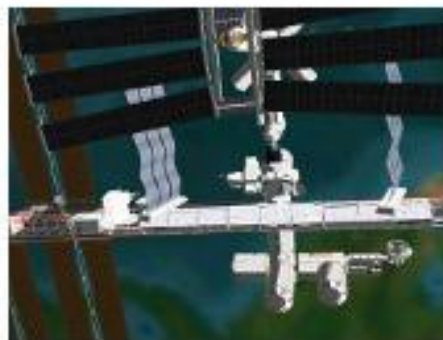
Payload Type	Containerized Payloads					Adapter Diameter		
	1U	3U	6U	12U	24U	8-15 inch	15-24 inch	24 inch
Length (max) cm	10.0	34.0	36.6	36.6	68.0	70	98	125
Height (max) cm	10.0	10.0	10.0	22.6	22.6	30	60	80
Width (max) cm	10.0	10.0	22.6	22.6	22.6	30	60	80
Mass (max) kg	1.0	5.0	10.0	20.0	40.0	70	190	300
Price – Orbital (LEO)	\$125k	\$325k	\$595k	\$995k	\$1,795k	\$2,950k	\$4,950k	\$6,950k
Price – Orbital (GTO)	\$250k	\$650k	\$995k	\$1,950k	\$2,950k	\$5,500k	\$7,950k	\$9,960k
Price – Orbital (GSO / LLO)	\$490k	\$995k	\$1,990k	\$3,250k	\$5,950k	\$9,950k	\$15,900k	\$19,900k

```

REM                               Satellite Position by Numerical Integration
REM                               -----
REM Version 2.3                    Last modified 1995 Mar 27
REM                               (C)1991-5 J.R.Miller G3RUH
REM
REM Vectors.  Components are subscripted i,j,k
REM
REM   R      Satellite true position
REM   V      Satellite true velocity
REM   A      Satellite perturbing force
REM
REM   S      Sun's position
REM   M      Moon's position
REM
REM The units used are kg, km, sec (*), radians.
REM Coordinate system is Earth Centered Inertial (ECI)
REM
REM (*) Note: DN and TN are in days.
REM
REM This BASIC, like PASCAL and C, implements scoping of variables.
REM Formal parameters of procedures and functions are LOCAL.
REM This means that assigning a value to a variable within
REM the procedure does not affect the value of any variable
REM elsewhere in the program which has the same name.
REM
REM Names are case-significant.  So AZ <> az <> AZ
REM Integer variables end in %, e.g. I%, J%.
REM All other variables are floating point.
:
ON ERROR PROCerror
:
VDU26,12,15:                      REM Clear screen (CLS)
PROCinitialise:                   REM Constants etc
PROCinit_sun_moon:                REM Set up Sun and moon model constants
:
REM Begin with a set of Keps.  Alternatives shown.  Try to choose an
REM apogee epoch when inclination is in the middle of its diurnal wiggle.
:
YE = 1988: TE=193.9: IN=57.654: RA=247.538: EC=0.65389: WP=187.221
MA=357.217: MM=2.09697960: RV=57: MA=173.5 : REM Post 1st burn
:
REM Convert degrees to radians etc.
IN=RAD(IN): RA=RAD(RA): WP=RAD(WP): MA=RAD(MA): MM=2*PI*MM/DS: REM rad/s
A=(GM/MM/MM)^(1/3): B=A*SQR(1-EC*EC): QD=0: WD=0:
DE = FNday(YE,1,0) + INT(TE): TE = TE-INT(TE): REM Days
:
REM Initialisation for very first entry.  DN = Day Now, TN = Time Now
:
DN = DE: TN = TE:                  REM Initial time is epoch,

```

General Mission Analysis Tool



GMAT 2012a BETA

Contributors: **Darrel Conway, Steven Hughes, Linda Jun, Wendy Shoan, Joel Parker, Tuan Nguyen, Tom Grubb, Shawn Hoffman, John Bez, Harvey Walden, Vladimir Lumelsky, Rizwan Qureshi**

Contributing Organizations: NASA/GSFC, AFRL, Thinking Systems, Inc., The Schafer Corporation, a.i. solutions, Inc., Computer Sciences Corporation, Honeywell Technology Solutions, The Boeing Company, NASA/JPL

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C:\Program Files\GMATVR2012a\samples\EX_Amsat_Oscar-13.script - General Mission Analysis Tool (GMAT)

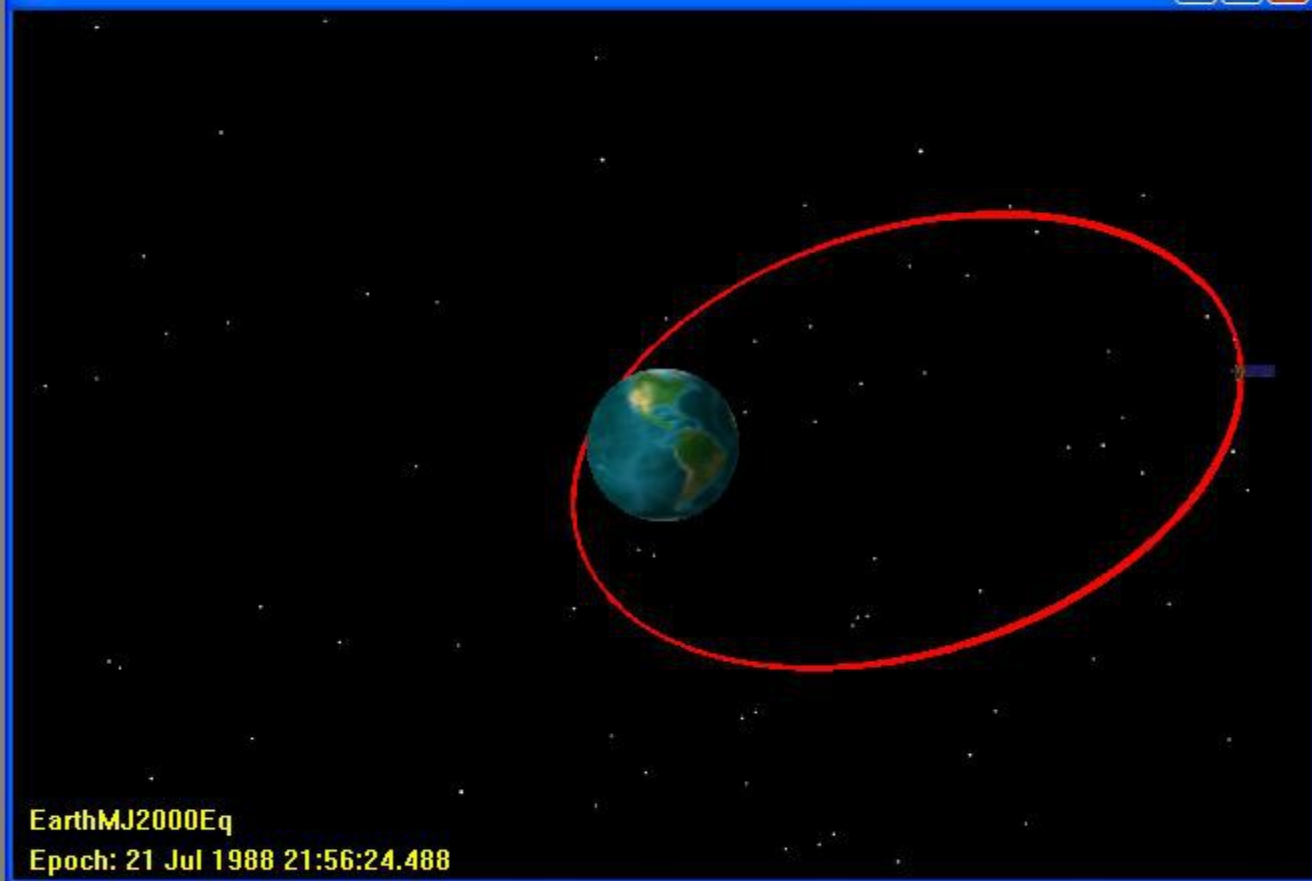
File Edit Window Help

GUI/Script Sync Status: **Synchronized**

Resources Mission Output

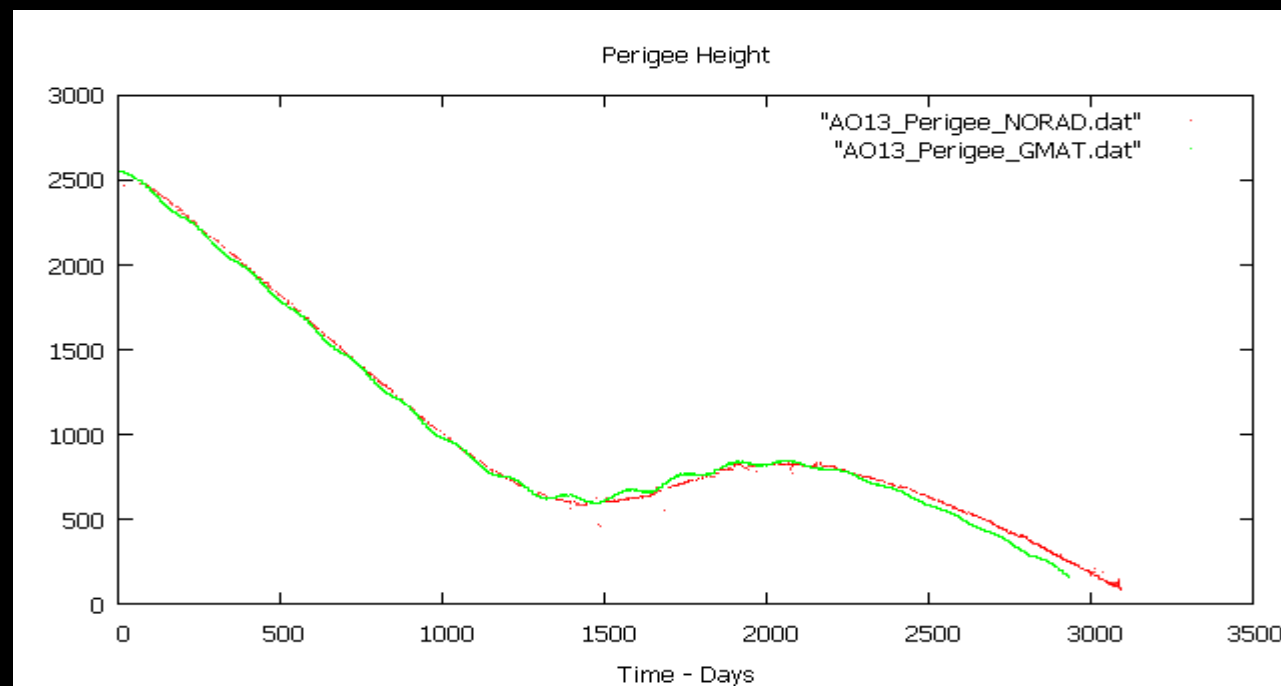
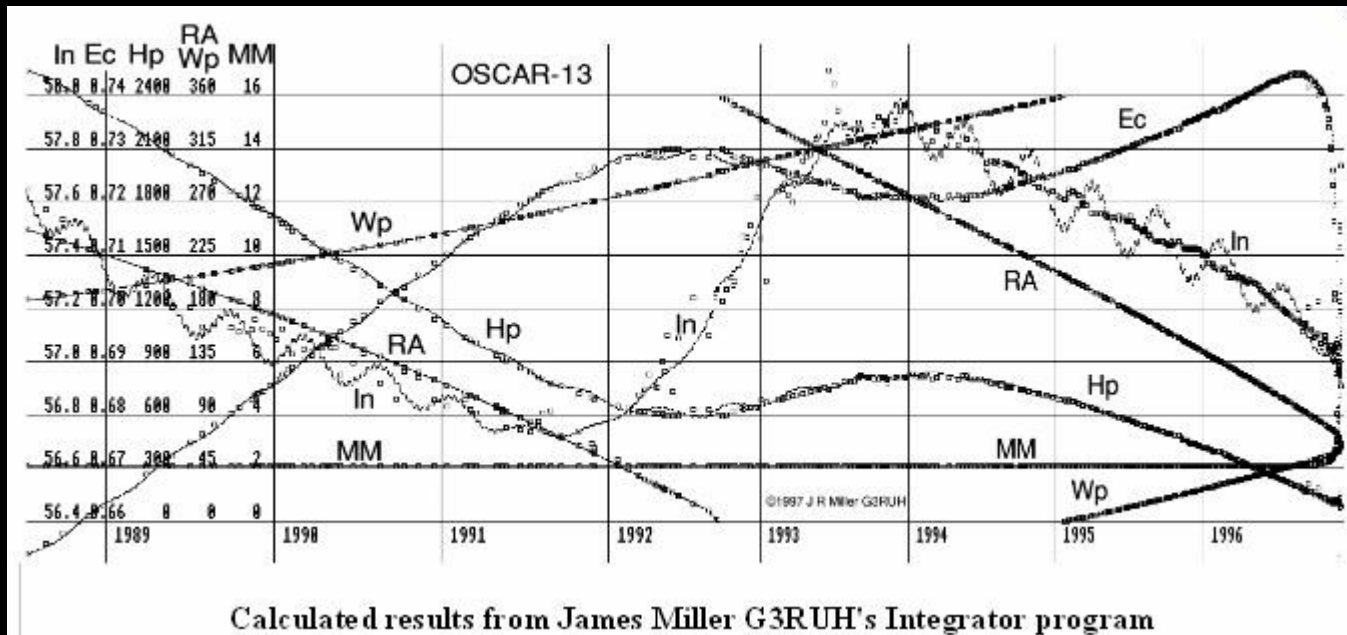
- Spacecraft
 - Sat
- Formations
- Ground Station
- Hardware
- Burns
 - DefaultIB
- Propagators
 - DefaultProp
- SolarSystem
- Solvers
- Output
 - Enhanced3DView1
 - ReportFile1
- Interfaces
- Scripts
 - EX_Amsat_Oscar-13.s
- Variables/Arrays/Strings
 - I
 - DAY
 - PG
 - ECC
 - AOP
 - INC
 - RAAN
- Coordinate Systems
 - EarthMJ2000Eq
 - EarthMJ2000Ec
 - EarthFixed
 - LVLH
 - Solar

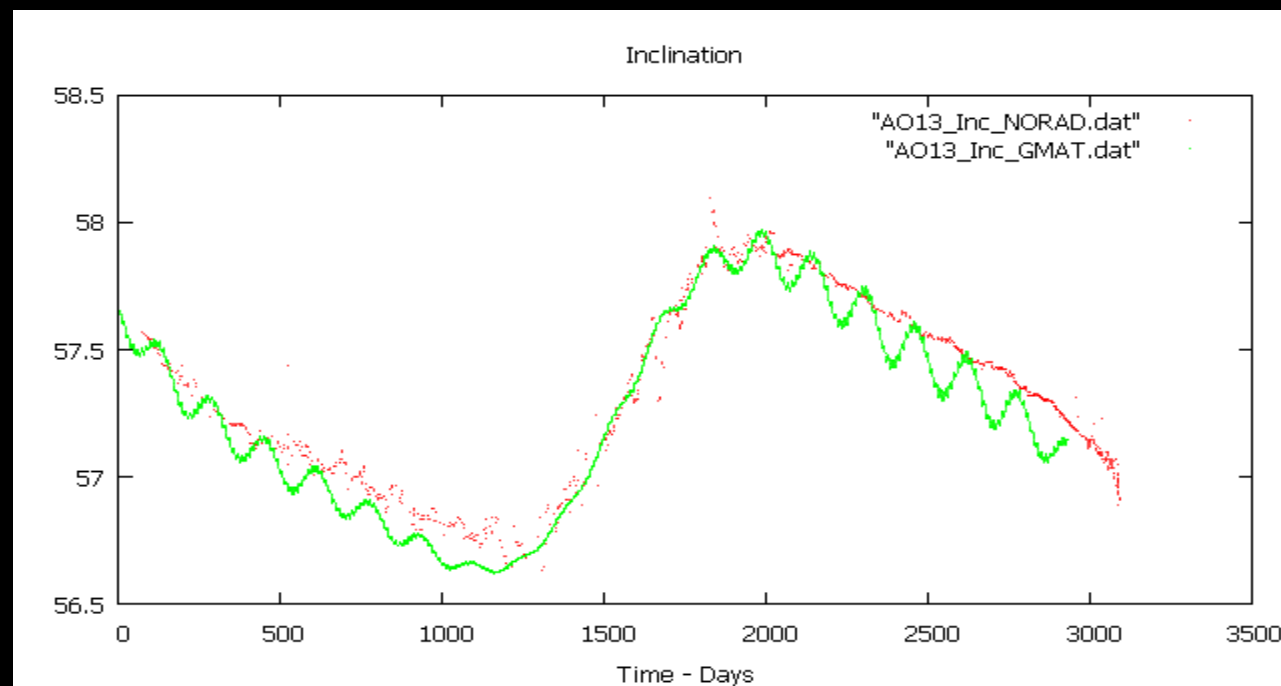
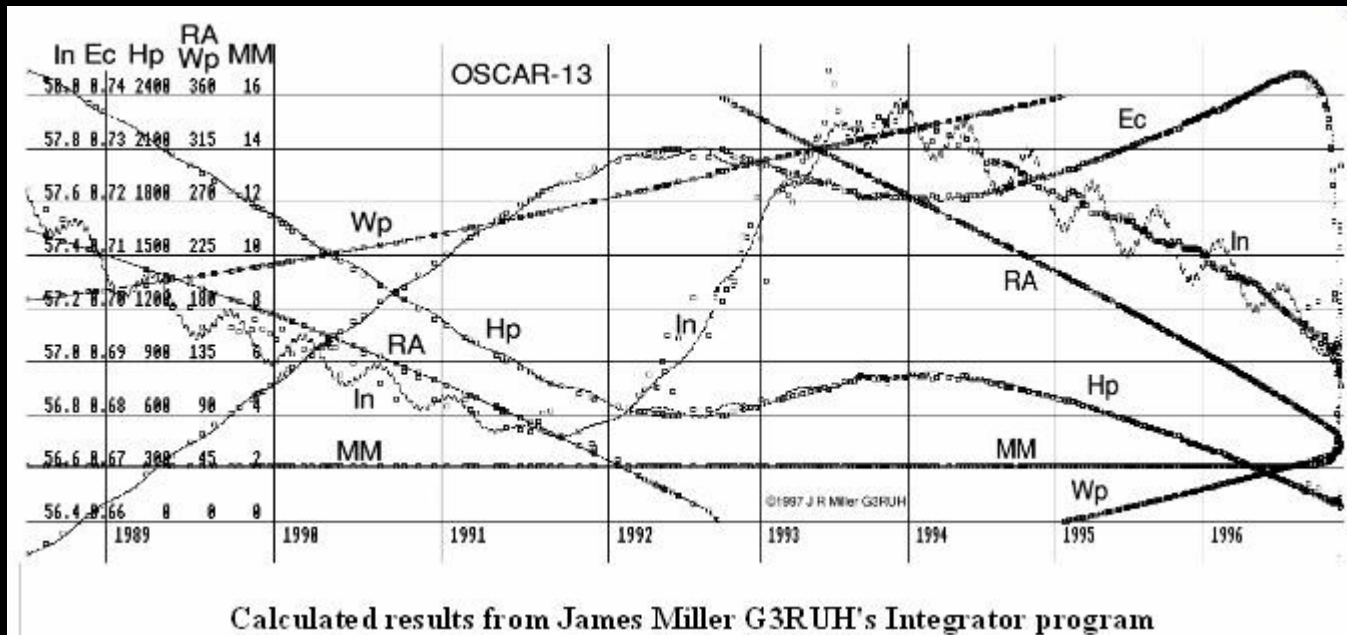
Enhanced3DView1

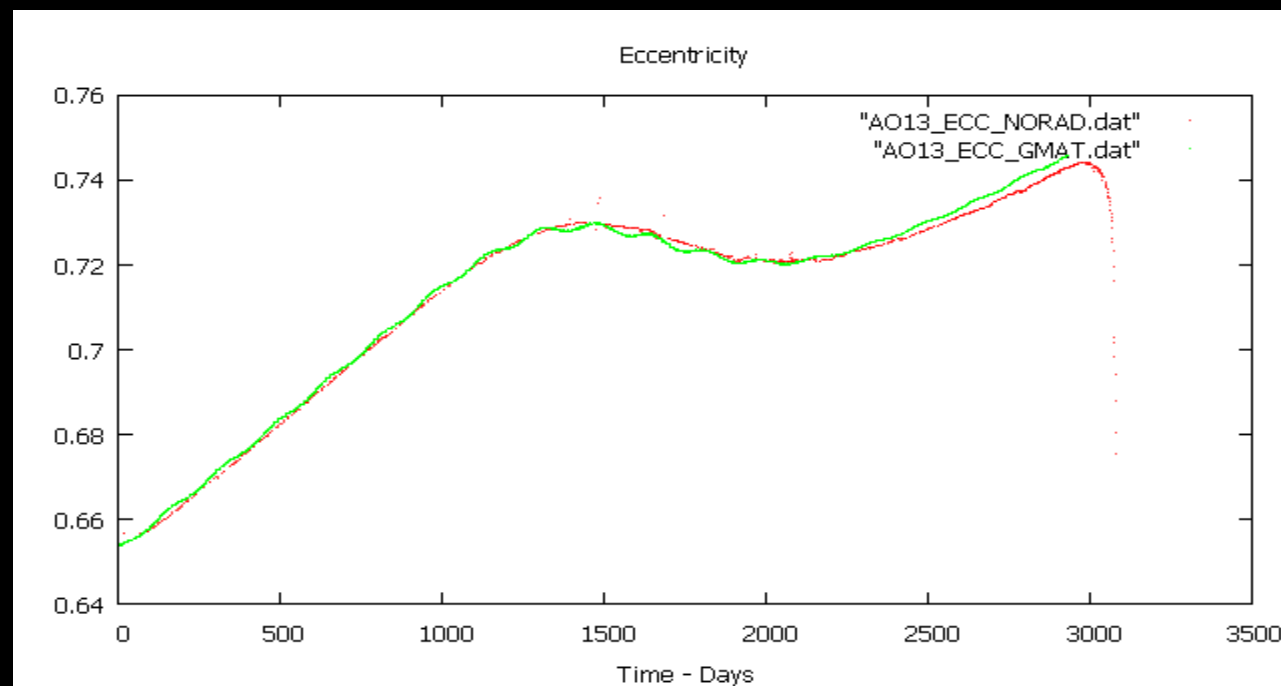
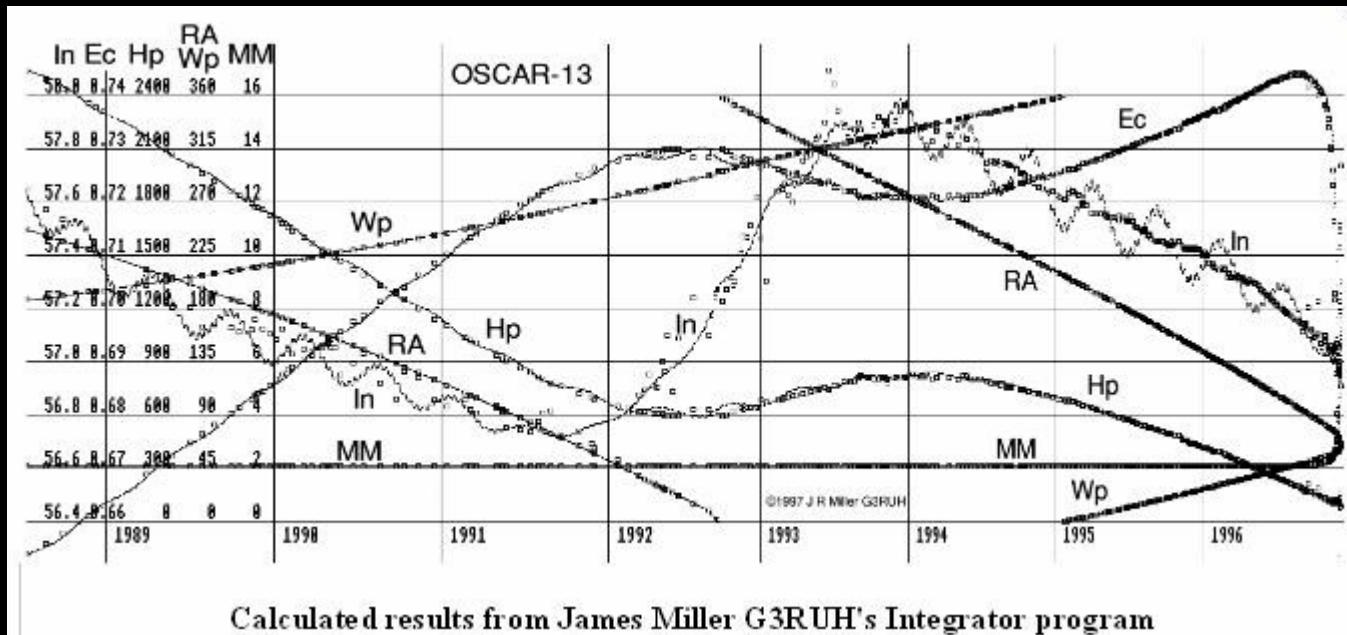


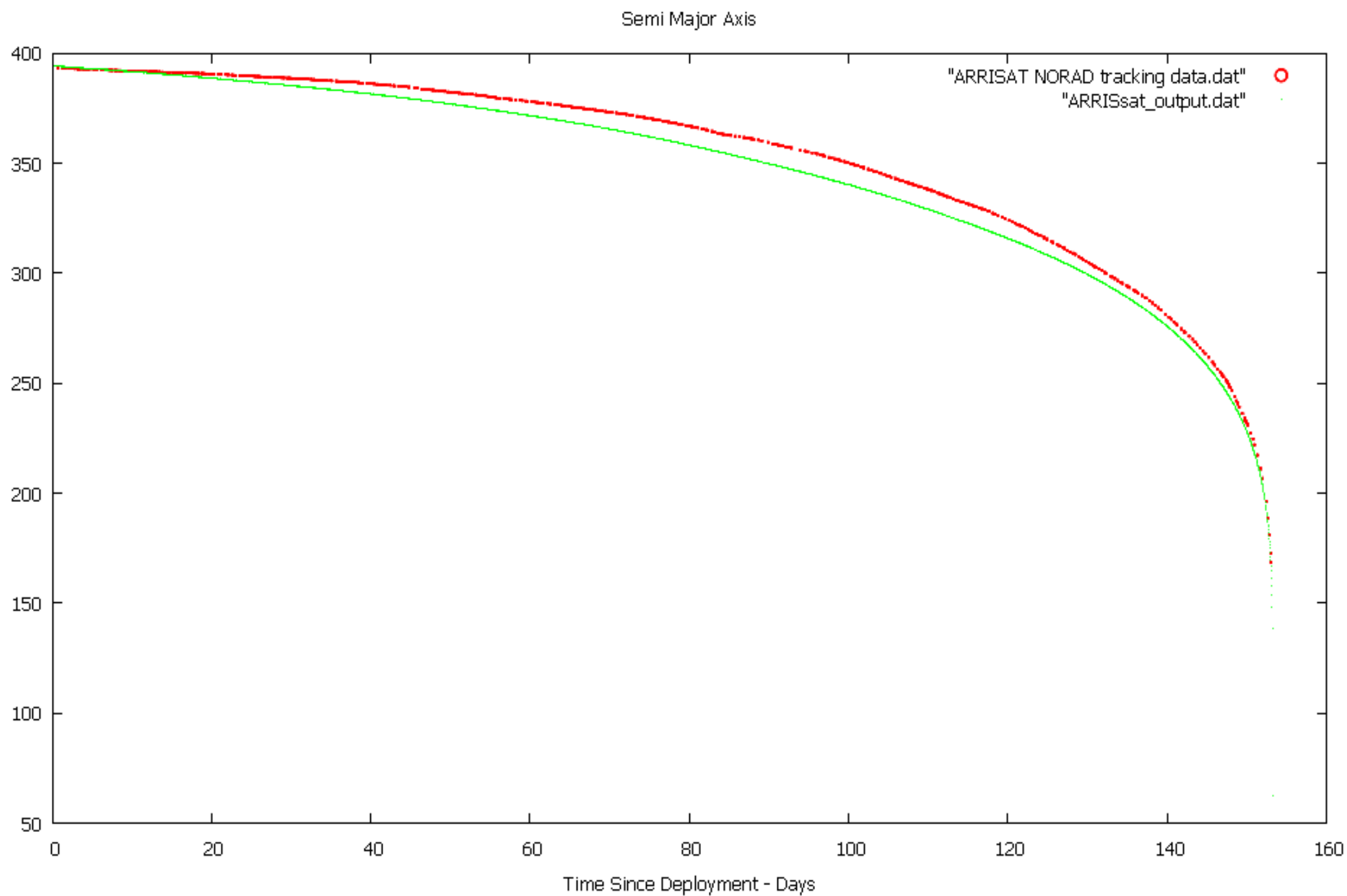
EarthMJ2000Eq
Epoch: 21 Jul 1988 21:56:24.488

C:\Pro...











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Input

ISP class *

2500s

Power [W] *

25

Satellite mass [kg] *

30

Required deltaV [m/s] *

250

* Required field

Output

Propulsion system dry mass [g] 752.72

Propellant mass [g] 315.06

Propulsion system wet mass [g] 1067.78

Total satellite mass [g] 31067.78

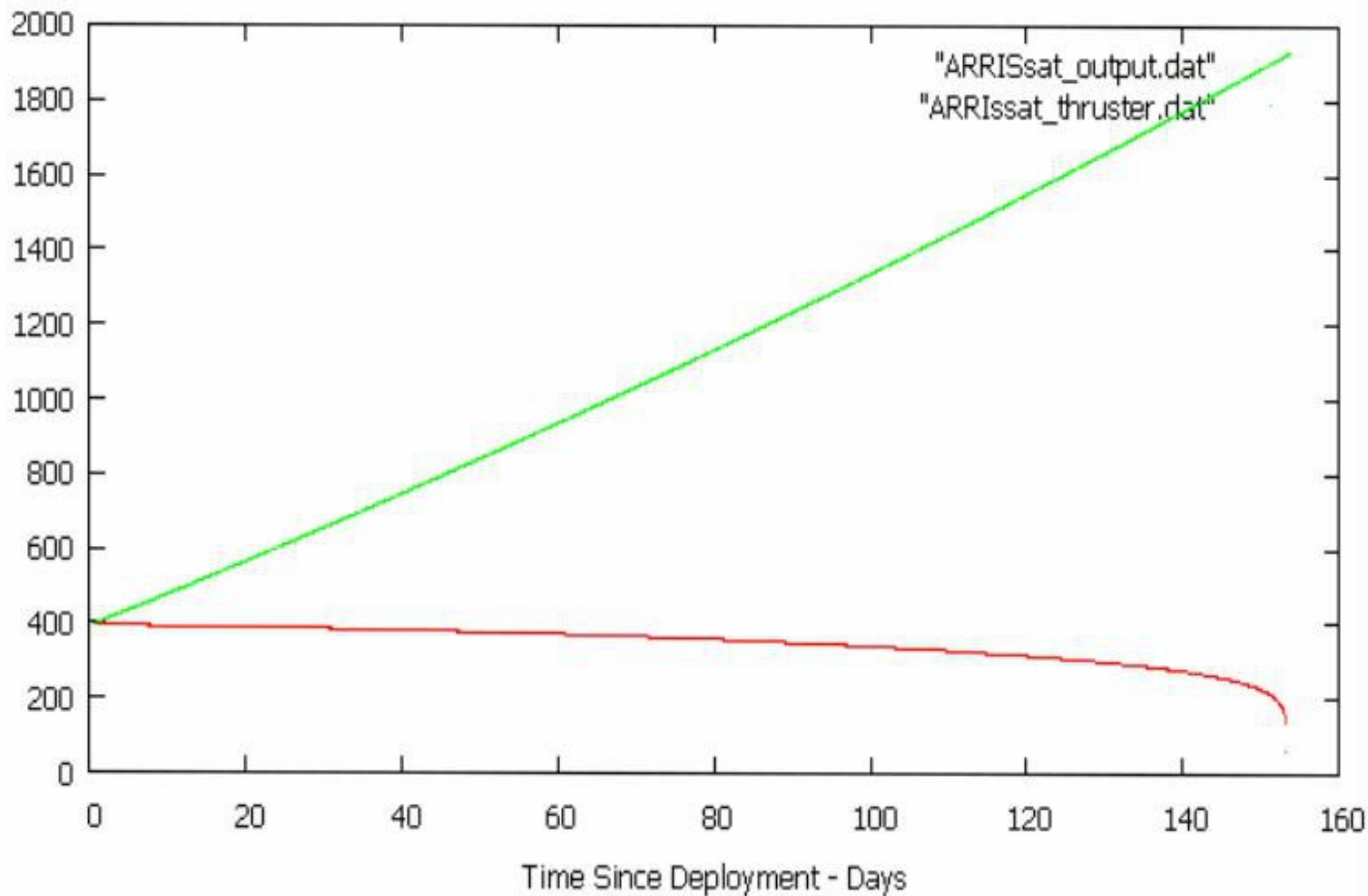
Propulsion system volume [cm³] 1159.89

Thrust level [mN] 1.75

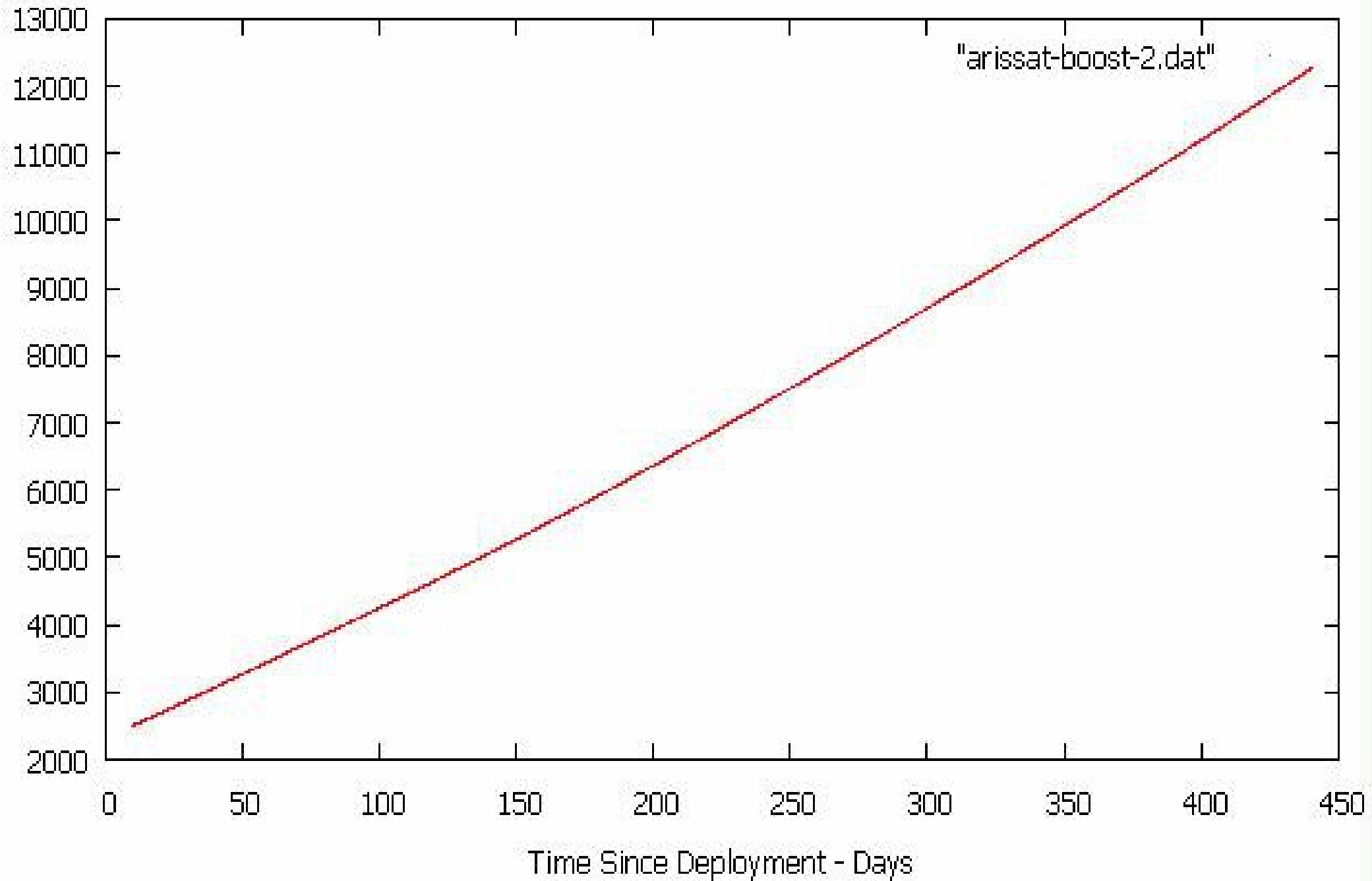
Propelled flight time [hours] 1226.49

Propelled flight time [Months] 1.68

Semi Major Axis



Semi Major Axis







Космический аппарат
«Кристалл-Спутник»
«Кристалл-Спутник»
КР-100/КР-100

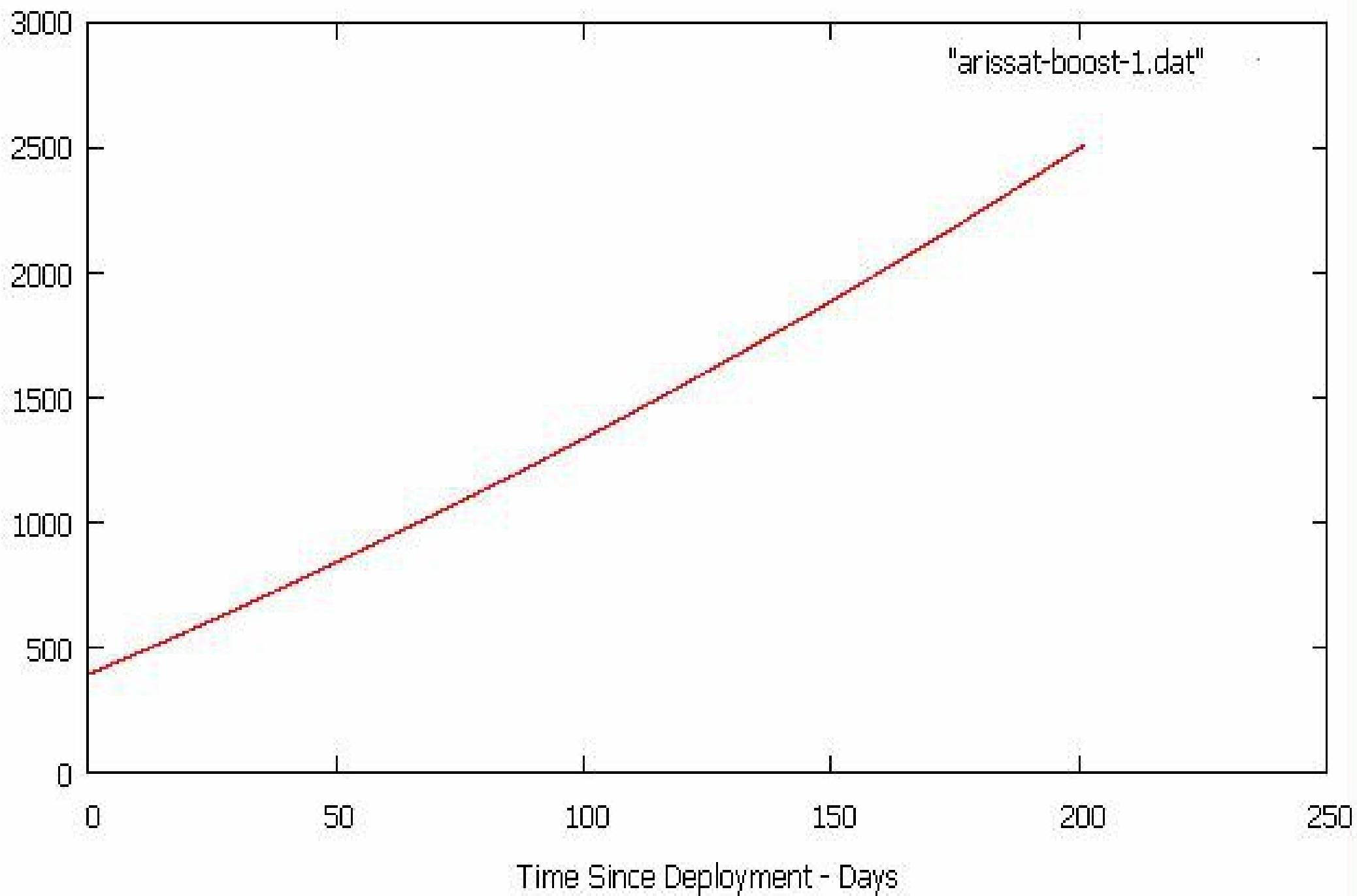
«Радоскаф-В»
«Радоскаф-В»
«Радоскаф-В»
«Радоскаф-В»



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Semi Major Axis





(ARRISsat.A1ModJulian) vs (ARRISsat.Earth.Altitude)

